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COMPOSITION OF HIGH-DENSITY POWDER NON-IONIC DETERGENT AND MANUFACTURING METHOD THEREOF

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Detailed explanation of invention

The present invention concerns a composition of high-density non-ionic powder detergent and a manufacturing method thereof. In particular, the present invention concerns a

composition of a powder detergent using a non-ionic surfactant as a main ingredient for the detergent and using a fluidity aiding agent, bonding and solidifying agent, and granulating agent to densify the detergent, and its manufacturing method. Therefore, the present invention detergent has a higher density, higher fluidity, and stronger cleaning power than a detergent manufactured using a conventional spraying and drying method.

In general, various manufacturing methods are known for powder detergents for a washer. A method using a circulating spraying and drying tower is widely known, and it readily allows mass-production and produces excellent particle homogeneity. The apparent density of a detergent manufactured by this method is 0.3-0.45 g/cm^3 which gives high volume per unit weight. Therefore, this product requires a large warehouse space for storing goods and a high transportation cost is inevitable. In addition, a large number of products cannot be displayed in a showcase with limited space. The cost of circulating drying equipment is high, and therefore a large investment is needed for the installation.

To solve these problems, research has been carried out to find a process without a circulating spray step and to densify a powder detergent. To achieve densification of powder detergent without using a circulating spray process, a manufacturing method for high density powder detergent was suggested wherein ingredients for the detergent including an anhydrous surfactant, builder, and other additives are placed in a high speed rotating assembly (vertical high speed mixer or Lodige mixer) and mixed homogeneously, and then the liquid material is sprayed to form contact points among particles, followed by coating the surface with a water insoluble inorganic material to reduce adhesiveness among the particles.

However, to form the mixture of surfactant, builder, and other additives into particles, a liquid binder that is suitable for coagulating each ingredient of the particles must be used for coagulation, and then the surface is coated with a water insoluble fluidity aid agent to produce particles. If the bonding strength of the liquid binder is low, coagulation among the mixed particles does not occur, and therefore it is difficult to manufacture a detergent with an apparent density higher than 0.6 g/cm^3, a general standard for a high density detergent. Not only is it difficult to remove moisture from a straight chain alkyl benzene sulfonate, olefin sulfonate, or alkyl sulfonate normally used for the powder structure, but also the price of the anhydrous raw material is high, increasing the production unit price.

The prior art to solve these problems includes Japanese Patent Nos. 78-4371, 87-263299, and 90-229894. In Japanese Patent No. 78-4371, the powder detergent is formed into particles by using a sprayed and dried builder as a basic particle to which the non-ionic surfactant is absorbed. Japanese Patent No. 87-263299 describes a method, wherein zeolite, hard sodium carbonate, and non-ionic surfactant are mixed to obtain a solid form, which is then pulverized using a high speed rotating assembly to obtain a high density detergent in a powder form. In

addition, Japanese Patent No. 90- 229894 describes a technology wherein a hard sodium carbonate and medium sodium carbonate non-ionic detergent is absorbed then with the surface coated with zeolite to produce a high-density powder detergent. It is difficult to increase the content of the non-ionic surfactant, a detergent ingredient, in the detergent manufactured using the above methods because the non-ionic surfactant in liquid form is absorbed into the builder particles and the non-ionic surfactant can seep out of the particles during long-term storage, resulting in poor fluidity of the detergent and hardening into lumps.

The authors of the present invention investigated to solve the aforementioned existing problems. As a result, we discovered that a high density powder non-ionic detergent with an apparent density higher than 0.6 g/cm^3, preferably 0.6-1.2g/cm^3, and with improved fluidity, anti-caking property and productivity for the high-density detergent, can be manufactured by using a liquid binding agent suitable for combining builder particles, dissolving a small amount of bonding coagulant and granulating agent in this binding agent, and then injecting the resulting binding agent into the builder mixture.

The present invention provides a manufacturing method for a high-density powder non-ionic detergent, wherein a binding coagulant such as polyethylene glycol or polypropylene glycol and a granulating agent such as polyvinylpyrrolidone are dissolved in a non-ionic surfactant as an ingredient for washing and a liquid binding agent, to which a homogeneous mixture of sodium carbonate, sodium sulfate, and sodium silicate is added and mixed homogeneously; zeolite as a fluidity aid agent is added, and then the resulting mixture is pulverized and converted into particles.

The manufacturing method of the present invention is described below in detail. The present invention provides a manufacturing method for a high-density powder non-ionic detergent, wherein 5-50 wt% of sodium carbonate, 1-15 wt% of sodium sulfate, and 1-20 wt% of sodium silicate are mixed [and set aside]; 0.5-10 wt% of polyethylene glycol, 0.1-5 wt% of polyvinylpyrrolidone, and 0.1-2 wt% of fluorescent whitening agent are added to 10-35 wt% of non-ionic surfactant, which is then heated to 60-80°C to dissolve the solids and introduced into the mixture of sodium carbonate, sodium sulfate and sodium silicate while mixing to give a slurry; after 10-60 wt% of powdered zeolite is added to this slurry mixture and mixed, 0.1-10 wt% of additives selected from a fragrance, enzyme, and foaming agent is mixed.

The mixer used in manufacturing the high density powder non-ionic detergent of the present invention is a vertical high speed mixer (Japanese Fukae Company) or Lodige Mixer (German Lodige Company), but other mixers can be used.

As a non-ionic surfactant used in the present invention, it is preferred to employ an alkylethoxylate which is obtained by adding 1-20 moles of ethylene oxide to an alkyl group with 10-20 carbon atoms. If the non-ionic surfactant used is less than 10 wt%, the bonding among

particles is not sufficient and the product falls apart, gives poor fluidity, and provides lower washing power. If the non-ionic surfactant used is more than 35 wt%, the liquid component is excessive with wetting of the surface of the particles and lowering of the fluidity of the powder (detergent).

Sodium carbonate employed as a builder increases the hydrogen ion concentration of the detergent and thereby increases the washing power. Sodium carbonate also absorbs non-ionic surfactant and is effective in forming particles. If sodium carbonate is used at less than 5%, the hydrogen ion concentration of the detergent is low, and the washing power is not sufficient. If the sodium carbonate is used at more than 50%, particlaes cannot be formed. Therefore, 5-50 wt% is preferred.

Sodium sulfate employed as another builder ingredient has a function to adsorb non-ionic surfactant and an ion-buffering function in the washing liquid. If this ingredient is used at less than 1 wt%, the ion buffering function and non-ionic surfactant adsorbing effect are poor. If more than 15 wt% is used, the contents of other ingredients are relatively decreased, lowering the washing power and fluidity. Therefore, 1-15 wt% is preferable.

Sodium silicate used as another builder ingredient improves the strength of the particles and increases the hydrogen ion concentration of the washing solution. Its ideal content is 1-20 wt%. If the content is less than 1 wt%, the above functions become poor. If more than 20 wt% is used, the strength of the particles increases excessively with a resulting dusty powder and a decrease in solubility.

10-60 wt% of the powder zeolite as a fluidity aiding agent is preferable. If the amount of the powder zeolite used is less than 10 wt%, the absolute amount of zeolite coated on the surface of particles into which the non-ionic surfactant is absorbed is not sufficient, and the fluidity becomes poor. If the amount of the powder zeolite used is more than 60 wt%, the size of the particles becomes small to give poor fluidity and a resulting dusty power, which lowers the productivity.

Polyethylene glycol (molecular weight 1000-25,000) or polypropylene glycol (molecular weight 1000-25,000) employed as a bonding coagulant is absorbed while dissolved in a non-ionic surfactant into particles, and has a function of increasing the bonding strength and the hardness of the particles. The preferred amount is 0.5-10 wt%. If the amount of polyethylene glycol or polypropylene glycol dissolved in the non-ionic surfactant is less than 0.5 wt%, it is difficult to form particles. If the amount exceeds 10 wt%, the hardness of the particle formed increases to decrease the solubility and the washing power.

0.1-5 wt% of polyvinyl pyrrolidone (molecular weight 10,000 - 2,800,000) is preferable as a granulating agent. If the content of polyvinylpyrrolidone is less than 0.1 wt%, it is difficult to granulate the particles. If the content exceeds 5 wt%, the size of the granulate excessively

increases to decrease the apparent density and to raise costs. Additives employed in the present invention include fragrances, fluorescent whitening agents (styrenes, biphenyls, paraffins, fumarines, quinolines), enzymes (protease, amylase, lipase, cellulase), and foam control agents (zibines [transliteration], silicones, paraffin waxes). The preferred total amount is 0.1-10 wt%. If the total amount is less than 0.1 wt%, it is difficult to achieve the function of each additive. If the total amount exceeds 10 wt%, the manufacturing cost increases.

The present invention is described below using experimental examples. However, the present invention is not limited to these experimental examples.

Experimental Example 1

Sodium carbonate, sodium sulfate, and sodium silicate were placed in a high-speed rotating assembly (Vertical High Speed Mixer (Japanese Fukae Company) or Lodige Mixer (German Lodige Company) in composition ratios listed in the following Table 1, and each composition was then homogeneously mixed for 5 min, followed by the addition of a non-ionic surfactant solution in which fluorescent dye Tinopal-CBSX (Swiss Ciba-Geigy Company), polyethylene glycol (molecular weight: 4000), and polyvinylpyrrolidone (molecular weight 55,000) were dissolved by heating. Each resulting mixture was homogeneously mixed for 5 min for absorption. A fluidizing aiding agent was added to this slurry mixture, which was then pulverized for 5 min and formed into particles, followed by the addition of a fragrance, enzyme, and foaming agent. The resulting mixture was mixed for 1 min to manufacture a high-density powder non-ionic detergent.

High-density powder non-ionic detergents A-F were manufactured by varying the content of the non-ionic surfactant, which serves as a cleaning and liquid binding component, from 10-35 wt%.

Table 1

(1) 표 1 (2) (단위 : 중량%)

(3) 세제 조성물	(4) 비교예 1	A	B	C	D	E	F
LAS 1)	25						
AOS 2)	15						
비이온 계면활성제 3)	5						
폴리비닐 피롤리돈 4)		10	15	20	25	30	35
폴리에틸렌 글리콜 5)		1	1	1	1	1	1
폴리프로필렌 글리콜 6)		5	5	5	5	5	5
(5) 탄산나트륨	20	30	30	30	25	25	25
규산나트륨	15	5	5	5	5	5	5
황산나트륨	0.3	12.3	7.3	2.3	12.3	2.3	2.3
제올라이트	15	35	35	35	25	30	25
형광염료 7)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
효소 8)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
소포제 9)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
물	0.2	0.2	0.2	0.2	0.2	0.2	0.2

*1) Sodium dodecyl benzene sulfonate
2) Sodium alfa-olefin sulfonate (C12:C14 = 7:3)
3) Alkyl ethoxylate (C12, number of moles of ethylene oxide added: 7, AE-7 (Korean Polyol [illegible] Company))
4) Weight average molecular weight 55,000
5) Weight average molecular weight 4,000
6) Weight average molecular weight 4,000
7) Tinopal-CBSX (Swiss Ciba-Geigy Company)
8) Savinese 6.0T(Danish NOVO Company)
9) LDC1215 (Lucky CC Silicon Company)

Key:
1 Table 1
2 Units: wt%
3 Detergent component
4 Experimental Example 1
5 Sodium salt of fatty acid
Non-ionic surfactant [3)]
Polyvinylpyrrolidone [4)]
Polyethylene glycol [5)]
Polypropylene glycol [6)]
Sodium carbonate
Sodium silicate
Sodium sulfate

Zeolite
Fluorescent dye[7)]
Enzyme[8)]
Foaming agent[9)]
Fragrance

Experimental Example 2

High-density powder non-ionic detergents G-L were manufactured by varying the content of sodium carbonate from 5-50 wt% using compositions listed in Table 2 and the method described in Experimental Example 1.

Table 2

① 표 2.						② (단위: 중량%)
③ 제제 조성물	G	H	I	J	K	L
LAS 1)						
AOS 2)						
직쇄산 나트륨						
에어로 계면활성제 3)	20	20	20	20	15	15
폴리머닉 저분자물 4)	1	1	1	1	1	1
폴리에틸렌 글리콜 5)	5	5	5	5	5	5
폴리프로필렌 글리콜 6)						
탄산나트륨	5	15	25	35	45	50
④ 규산나트륨	5	5	5	5	5	5
중탄나트륨	7.3	7.3	7.3	2.3	2.3	2.3
제올라이트	55	45	35	30	25	20
형광염료 7)	0.5	0.5	0.5	0.5	0.5	0.5
효소 8)	0.5	0.5	0.5	0.5	0.5	0.5
소포제 9)	0.5	0.5	0.5	0.5	0.5	0.5
향	0.2	0.2	0.2	0.2	0.2	0.2

*1) Sodium dodecyl benzene sulfonate (C12)
2) Sodium alfa-olefin sulfonate (C12:C14 = 7:3)
3) Alkyl ethoxylate (C12, number of moles of ethylene oxide added:7, AE-7 (Korean Polyol [illegible] Company))
4) Weight average molecular weight 55,000
5) Weight average molecular weight 4,000
6) Weight average molecular weight 4,000
7) Tinopal-CBSX (Swiss Ciba-Geigy Company)
8) Savinese 6.0T (Danish NOVO Company)
9) LDC1215 (Lucky CC Silicon Company)

Key: 1 Table 2
2 Units: wt%
3 Detergent component
4 Sodium salt of fatty acid
Non-ionic surfactant [3)]
Polyvinylpyrrolidone [4)]
Polyethylene glycol [5)]
Polypropylene glycol [6)]
Sodium carbonate
Sodium silicate
Sodium sulfate
Zeolite
Fluorescent dye[7)]
Enzyme[8)]
Foaming agent[9)]
Fragrance

Experimental Example 3

High-density powder non-ionic detergents N-O were manufactured by varying the content of sodium silicate from 5-20 wt% using compositions listed in Table 3 and the method described in Experimental Example 1. High-density powder non-ionic detergents P-R were manufactured by varying the content of sodium sulfate from 5-15 wt% using the method described in Experimental Example 1.

Table 3

① 표 3 ② (단위 : 중량%)

③ 세제 조성물	M	N	O	P	Q	R
LAS 1)						
AOS 2)						
지방산 나트륨						
비이온 계면활성제 3)	20	20	20	20	20	20
폴리비닐 피롤리돈 4)	1	1	1	1	1	1
폴리에틸렌 글리콜 5)	5	5	5	5	5	5
폴리프로필렌 글리콜 6)						
탄산나트륨	30	25	20	17.5	22.3	22.3
④ 규산나트륨	5	10	20	5	5	5
황산나트륨	2.5	2.5	2.5	5	10	15
제올라이트	35	35	20	35	35	30
형광염료	0.5	0.5	0.5	0.5	0.5	0.5
효소	0.5	0.5	0.5	0.5	0.5	0.5
소포제	0.5	0.5	0.5	0.5	0.5	0.5
향	0.2	0.2	0.2	0.2	0.2	0.2

*1) Sodium dodecyl benzene sulfonate (C12)
2) Sodium alfa-olefin sulfonate (C12:C14 = 7:3)
3) Alkyl ethoxylate (C12, number of moles of ethylene oxide added: 7, AE-7 (Korean Polyol[illegible] Company))
4) Weight average molecular weight 55,000
5) Weight average molecular weight 4,000
6) Weight average molecular weight 4,000
7) Tinopal-CBSX (Swiss Ciba-Geigy Company)
8) Savinese 6.0T (Danish NOVO Company)
9) LDC1215 (Lucky CC Silicon Company)

Key:
1 Table 3
2 Units: wt%
3 Detergent component
4 Sodium salt of fatty acid
Non-ionic surfactant 3)
Polyvinylpyrrolidone 4)
Polyethylene glycol 5)
Polypropylene glycol 6)
Sodium carbonate
Sodium silicate
Sodium sulfate
Zeolite
Fluorescent dye

Enzyme
Foaming agent
Fragrance

Experimental Example 4

High-density powder non-ionic detergents S-X were manufactured by varying the content of zeolite, a fluid aiding agent, from 10-60 wt% using compositions listed in Table 4 and the method described in Experimental Example 1.

Table 4

(1) 표 4 (2) (단위 : 중량%)

(3) 세제 조성물	S	T	U	V	W	X
LAS 1)						
AOS 2)						
지방산 나트륨						
비이온 계면활성제 3)	20	20	20	20	20	20
폴리비닐 피롤리돈 4)	1	1	1	1	1	1
폴리에틸렌 글리콜 5)	5	5	5	5	5	5
폴리프로필렌 글리콜 6)						
탄산나트륨	50	40	30	20	10	6
(4) 규산나트륨	5	5	5	5	5	3.3
황산나트륨	7.3	7.3	7.3	7.3	7.3	5
제올라이트	10	20	30	40	50	60
형광염료	0.5	0.5	0.5	0.5	0.5	0.5
효소	0.5	0.5	0.5	0.5	0.5	0.5
스프레	0.5	0.5	0.5	0.5	0.5	0.5
향	0.2	0.2	0.2	0.2	0.2	0.2

*1) Sodium dodecyl benzene sulfonate (C12)
2) Sodium alfa-olefin sulfonate (C12:C14 = 7:3)
3) Alkyl ethoxylate (C12, number of moles of ethylene oxide added:7, AE-7 (Korean Polyol[illegible] Company))
4) Weight average molecular weight 55,000
5) Weight average molecular weight 4,000
6) Weight average molecular weight 4,000
7) Tinopal-CBSX (Swiss Ciba-Geigy Company)
8) Savinese 6.0T (Danish NOVO Company)
9) LDC1215 (Lucky CC Silicon Company)

Key: 1 Table 4
2 Units: wt%
3 Detergent component

4 Sodium salt of fatty acid
Non-ionic surfactant [3)]
Polyvinylpyrrolidone [4)]
Polyethylene glycol [5)]
Polypropylene glycol [6)]
Sodium carbonate
Sodium silicate
Sodium sulfate
Zeolite
Fluorescent dye
Enzyme
Foaming agent
Fragrance

Experimental Example 5

High-density powder non-ionic detergents Y-AA were manufactured by varying the content of polyethylene glycol, a bonding coagulant, from 0.5-10 wt% using compositions listed in Table 5 and the method described in Experimental Example 1. High-density powder non-ionic detergents AB-AD were manufactured by varying the content of polypropylene glycol from 0.5-10 wt% using compositions listed in Table 5 and the method described in Experimental Example 1.

Table 5

① 표 5.					② (단위: 중량%)	
③ 세제 조성물	Y	Z	AA	AB	AC	AD
LAS 1)						
AOS 2)						
계면활성제						
비이온 계면활성제 3)	20	20	20	20	20	20
폴리비닐 피롤리돈 4)	1	1	1	1	1	1
폴리에틸렌 글리콜 5)	0.5	5	10			
폴리프로필렌 글리콜 6)				0.5	5	10
탄산나트륨	30	30	30	30	30	30
④ 규산나트륨	5	5	5	5	5	5
황산나트륨	9.8	5.3	0.3	9.8	5.3	0.3
제올라이트	32	32	32	32	32	32
형광염료	0.5	0.5	0.5	0.5	0.5	0.5
효소	0.5	0.5	0.5	0.5	0.5	0.5
소포제	0.5	0.5	0.5	0.5	0.5	0.5
향	0.2	0.2	0.2	0.2	0.2	0.2

*1) Sodium dodecyl benzene sulfonate (C12)
2) Sodium alfa-olefin sulfonate (C12:C14 = 7:3)
3) Alkyl ethoxylate (C12, number of moles of ethylene oxide added: 7, AE-7 (Korean Polyol[illegible] Company))
4) Weight average molecular weight 55,000
5) Weight average molecular weight 4,000
6) Weight average molecular weight 4,000
7) Tinopal-CBSX (Swiss Ciba-Geigy Company)
8) Savinese 6.0T (Danish NOVO Company)
9) LDC1215 (Lucky CC Silicon Company)

Key: 1 Table 5
2 Units: wt%
3 Detergent component
4 Sodium salt of fatty acid
Non-ionic surfactant [3)]
Polyvinylpyrrolidone [4)]
Polyethylene glycol [5)]
Polypropylene glycol [6)]
Sodium carbonate
Sodium silicate
Sodium sulfate
Zeolite
Fluorescent dye
Enzyme
Foaming agent
Fragrance

Experimental Example 6

High-density powder non-ionic detergent AE-Al were manufactured by varying the content of polyvinylpyrrolidone, a granulating agent, from 0.5-10 wt% using compositions listed in Table 6 below and the method described in Experimental Example 1.

Table 6

(1) 표 6 (2) (단위 : 중량%)

(3) 세제 조성물	AE	AF	AG	AH	AI	AJ
LAS 1)						
AOS 2)						
지방산 나트륨						
비이온 계면활성제 3)	20	20	20	20	20	20
폴리비닐 피롤리돈 4)	0.5	2	4	6	8	10
폴리에틸렌 글리콜 5)	5	5	5	5	5	5
폴리프로필렌 글리콜 6)						
(4) 탄산나트륨	30	30	30	30	30	30
규산나트륨	6	6	6	6	6	6
황산나트륨	7.8	6.5	4.5	2.5	1	1
제올라이트	30	30	30	30	20.5	17.5
형광염료	0.5	0.5	0.5	0.5	0.5	0.5
효소	0.5	0.5	0.5	0.5	0.5	0.5
산화제	0.5	0.5	0.5	0.5	0.5	0.5
기타	0.2	0.2	0.2	0.2	0.2	0.2

*1) Sodium dodecyl benzene sulfonate (C12)
2) Sodium alfa-olefin sulfonate (C12:C14 = 7:3)
3) Alkyl ethoxylate (C12, number of moles of ethylene oxide added: 7, AE-7 (Korean Polyol[illegible] Company))
4) Weight average molecular weight 55,000
5) Weight average molecular weight 4,000
6) Weight average molecular weight 4,000
7) Tinopal-CBSX (Swiss Ciba-Geigy Company)
8) Savinese 6.0T (Danish NOVO Company)
9) LDC1215 (Lucky CC Silicon Company)

Key:
1 Table 6
2 Detergent component
3 Sodium salt of fatty acid
4 Non-ionic surfactant [3)]
Polyvinylpyrrolidone [4)]
Polyethylene glycol [5)]
Polypropylene glycol [6)]
Sodium carbonate
Sodium silicate
Sodium sulfate
Zeolite

Fluorescent dye
Enzyme
Foaming agent
Fragrance

Experimental example 7

The test samples manufactured in the aforementioned Experimental Examples 1-6 were evaluated (measured) as described below and the results are listed in Table 7.

1) Washing power

High-density powder non-ionic detergents manufactured in Experimental Examples 1-6 above were tested for washing power using the following conditions, and the measurement results are listed in Table 7.

Measurement instrument:	Terg-O-Tometer
Washing temperature:	20°C
Washing water:	Hardness 40 ppm Ca, 10 ppm Mg
Bath ratio:	4.5 g dirty cloth/1 L washing water
Detergent concentration:	0.67 g/L
Dirty Cloth:	EMPA Art No. 101 (Olive oil, Carbon Black/side)

2) Fluidity

The fluidity was evaluated by measuring the time for 100 cc of the high-density powder non-ionic detergents manufactured in the aforementioned Experimental Examples 1-6 to pass through a funnel of 10 mm diameter, and the results are listed in Table 7.

3) Apparent density

The apparent density of the high-density powder non-ionic detergents manufactured in the aforementioned Experimental Examples 1-6 was measured and is listed in Table 7.

4) Caking property

500 g test samples were taken from the high-density powder non-ionic detergent compositions manufactured in Experimental Examples 1-6 above, and placed in a 1-L beaker and pressed with a 1-kg load, and these were then stored at 30°C at 80% relative humidity for 10 days. Samples were collected to determine the weight ratio of the solid with a radius larger than 5 mm and to evaluate the caking property. The results are listed in Table 7.

5) Yield

The yields of the high-density powder non-ionic detergents manufactured in Experimental Examples 1-6 above are listed in Table 7.

As shown in Table 7, the high-density powder non-ionic detergent of the present invention has a high apparent density; good fluidity, a good anti-caking property, and good yield; and excellent washing power.

Table 7

1		2	3	4	5	6
7						
8						

Key: 1 Table 1

2 Washing power (%)
3 Apparent density (g/cm^3)
4 Fluidity (sec)
5 Caking property (%)
6 Yield (%)
7 Comparative Example 1
8 Experimental Example ___

Claims

1. A high-density powder non-ionic detergent composition that contains 10-35 wt% of non-ionic surfactant; a powder detergent containing 5-50 wt% of sodium carbonate, 1-15 wt% of sodium sulfate, and 1-20 wt% of sodium silicate; 10-60 wt% of powdered zeolite; 0.5-10 wt% of polyethylene glycol or polypropylene glycol; 0.1-5 wt% of polyvinylpyrrolidone; and 0.1-10 wt% of additives.

2. The high-density powder non-ionic detergent composition claimed in Claim 1 that uses an alkylethoxylate of the following general formula as the non-ionic surfactant.
$RO(CH_2CH_2O)_nH$
where R is an alkyl group with 10-20 carbon atoms and n is an integer from 1-20.

3. The detergent composition claimed in Claim 1, wherein the molecular weight of the polyethylene glycol is 1000-25,000, and the molecular weight of the polypropylene glycol is 1000-25,000.

4. The detergent composition claimed in Claim 1, wherein the molecular weight of the polyvinylpyrrolidone is characteristically 10000-2,800,000.

5. The detergent composition claimed in Claim 1, wherein the additives are selected from a fragrance, foaming agent, enzyme, and fluorescence whitening agent.

6. The detergent composition claimed in Claim 1, wherein the density is characteristically higher than 0.6 g/cm^3.

7. A manufacturing method for a high-density powder non-ionic detergent, wherein 5-50 wt% of sodium carbonate, 1-15 wt% of sodium sulfate, and 1-20 wt% of sodium silicate are mixed [and set aside]; 0.5-10 wt% of polyethylene glycol or polypropylene glycol, 0.1-5 wt% of polyvinylpyrrolidone, and 0.1-2 wt% of fluorescent whitening agent are added to 10-35 wt% of non-ionic surfactant which is then heated to 60-80°C to dissolve the solids and introduced into the mixture of sodium carbonate, sodium sulfate and sodium silicate while mixing to give a slurry; after 10-60 wt% of powder zeolite is added to this slurry mixture and mixed, 0.1-10 wt% of additives selected from a fragrance, enzyme, and foaming agent is mixed.

8. The manufacturing method claimed in Claim 7, wherein the non-ionic surfactant is an alkylethoxylate of the following general formula.

$RO(CH_2CH_2O)_nH$,

where R is an alkyl with 10-20 carbon atoms and n is an integer from 1-20.

9. The manufacturing method claimed in Claim 7, wherein the molecular weight of the polyethylene glycol is 1000-25,000, and the molecular weight of the polypropylene glycol is 1000-25,000.

10. The manufacturing method claimed in Claim 7, wherein the molecular weight of the polyvinylpyrrolidone is characteristically 10000-2,800,000.

11. The manufacturing method claimed in Claim 7, wherein the apparent density of the manufactured detergent is characteristically higher than 0.6 g/cm^3.